

INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY 50X1-HUM

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COUNTRY	Yugoslavia/USSR	REPORT	
SUBJECT	Soviet-Type Missiles in the Yugoslav Armed Forces <i>description of missiles</i>	DATE DISTR.	21 NOV 1963
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1. On 5 October 1963, it was reported that missiles of the type described in the following report were possessed by the Yugoslav Armed Forces.

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2. These missiles use kerosene and nitric acid as fuel. The fuel tank is composed of two concentric cylinders:
- (1) The inside cylinder, which has a circular section piston, holds one of the two fuel components;
 - (2) The outside cylinder, which has a ring piston, holds the other of the fuel components.

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When the fuels are loaded into the tank, from the tail of the missile, the pistons are thrust forward; when the tank is full, the pistons are in a closed position, against a tank of compressed air. The compressed air thrusts the pistons towards the tail, thus forcing the fuel through the nozzles. The compressed air also serves to actuate the gyroscope and other instruments.

3. The combustion chamber with the nozzles is located in the tail. [] the nozzles as like a flower sprinkler or watering can: one set in a circle and the second in a ring surrounding the first. These two sets correspond to the two cylinders of the fuel tank, each set related to one cylinder.

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The mixing of the fuels then takes place in the discharge chamber. A chemical catalyst, enclosed in a glass vial, is located in the discharge chamber and serves as a priming agent; the catalyst is released by a small explosive charge and instantaneously ignites the fuels.

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4. The two sets of nozzles (watering cans) are pivot-mounted and moved by an [] /sic; possibly hydrodynamic/ mechanism which is attached to the two pistons. The nozzle complex can be adjusted to all possible angular positions in accordance with the linear position of the pistons. This mechanism thus controls the orientation of the missile.
5. a. The missile path is controlled by radar (wave length approximately 3 cm). The radar signals transmit ground commands to the missile and also maintain the missile on its course. If it should deviate from its course, as shown by a wavering trajectory, the control mechanism brings it back on the beam.

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- b. In the missile there is a control called [redacted] (literally, rotator of coordinates); in fact, in the missile it is subjected to a spinning movement around its own axis, whereas commands from the ground are related to a system of coordinates fixed in space. The "rotator" is related to the gyroscope: as the missile spins around its own axis, the signals furnished by the gyroscope actuate, through a phase-angle ("sfasamento") system, the "oleodynamic" control of the nozzle complex; in this way, commands to the missile function as if it were fixed in space. 50X1-HUM
- c. The phase-angle system includes an RF oscillator which supplies two signals at 90° to a special condenser with four dials; the rotor of this condenser is molded in a special way and a reading can be obtained from it which always conforms precisely to the momentary position of the axes of the missile with respect to the axes of the gyroscope.
6. The "oleodinamico" control has a special needle valve which, in essence, is the heart of the entire missile. So that this is not clogged, for command signals, coming from a solenoid, there is superimposed a sinusoidal signal with vibrations; the small motions that this effects on the needle of the valve are sufficient to avoid clogging.
7. The electronic instruments, which are almost completely transistorized (but not all of them), are located in the body of the missile alongside the fuel tanks. The antennas, of which there are four in one place, are located in the nose and look like small reversed "L's"; there is also a fifth antenna mounted laterally which is a slot-fed antenna used for the retransmission of telemetry data. The nose is insulated from the rest of the missile and antenna by a proximity device, which controls the priming of the explosive charge when the missile passes in the vicinity of the target. 50X1-HUM
8. The nose is empty, to accommodate the explosive charge. The available space is not large, by which it may be assumed that the missile is designed and intended for the transport of a nuclear charge. [redacted]
9. The missiles have an overall external length of 6 or 8 meters. There are two types: in Yugoslavia there are said to be about 100 of the 6-meter size and only two or three of the 8-meter missiles. The cruising speed runs about 9000 km/hour. [redacted]
10. These missiles are consigned completely to the care of Yugoslav military authorities at the present time. No special apparatus is necessary to launch these missiles; a ramp can be mounted on a railroad car or transported by truck in a convoy of vehicles on which are also mounted auxiliary items for direction finding, control, and telecommunications. In a convoy of this type there are 30 to 50 assigned personnel.

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